

Remarks

Claims 1-30 are pending in the application.

Claims 1-3, 10-11, 15-17, 24, 27, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt (U.S. Patent #6,476,952) in view of Ito (U.S. Patent #6,650,846).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt in view of Ito and further in view of Fujiwara et al. (US PGPub 2003/0161638).

Claims 5-9, 12-14, 18-23, 25-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt in view of Ito and further in view of Yao (U.S. Patent #5,654,818).

By this response, Applicants have canceled claims 1, 11, 15-18, 24, 27 and 30, and amended claims 2-5, 9, 10, 12, 19-23, 25-26 and 29. No new matter has been added.

Each of the various rejections and objections are overcome by amendments that are made to the specification, drawing, and/or claims, as well as, or in the alternative, by various arguments that are presented.

Any amendments to any claim for reasons other than as expressly recited herein as being for the purpose of distinguishing such claim from known prior art are not being made with an intent to change in any way the literal scope of such claims or the range of equivalents for such claims. They are being made simply to present language that is better in conformance with the form requirements of Title 35 of the United States Code or is simply clearer and easier to understand than the originally presented language. Any amendments to any claim expressly made in order to distinguish such claim from known prior art are being made only with an intent to change the literal scope of such claim in the most minimal way, i.e., to just avoid the prior art in a way that leaves the claim novel and not obvious in view of the cited prior art, and no equivalent of any subject matter remaining in the claim is intended to be surrendered.

Also, since a dependent claim inherently includes the recitations of the claim or chain of claims from which it depends, it is submitted that the scope and content of any dependent claims that have been herein rewritten in independent form is exactly the same as the scope and content of those claims prior to having been rewritten in independent

form. That is, although by convention such rewritten claims are labeled herein as having been "amended," it is submitted that only the format, and not the content, of these claims has been changed. This is true whether a dependent claim has been rewritten to expressly include the limitations of those claims on which it formerly depended or whether an independent claim has been rewritten to include the limitations of claims that previously depended from it. Thus, by such rewriting no equivalent of any subject matter of the original dependent claim is intended to be surrendered. If the Examiner is of a different view, he is respectfully requested to so indicate.

Rejection Under 35 U.S.C. 103(a)

Claims 1-3, 10-11, 15, 24, 27 and 29-30

Claims 1-3, 10-11, 15-17, 24, 27, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt in view of Ito. The rejection is traversed.

Claims 1, 11, 15-17, 24, 27 and 30 have been canceled, and their rejections are therefore moot.

Independent claim 10 has been amended to incorporate the feature of claim 11, which recites: "demodulating the APol-DPSK signal using an even bit delay line interferometer." Independent claim 29 has been amended to further recite "a demodulator comprising an even bit delay line interferometer". Subject matter of the amended claim is fully supported in the original specification, e.g., at least in claim 11 and in FIG. 3. No new matter has been added.

Applicants' independent claims 10 and 29 are directed to various aspects of alternating polarization-differential phase shift keying (APol-DPSK). As set forth below, the combined teaching of Snawerdt and Ito do not teach or suggest at least the claimed feature relating to an even bit delay line interferometer.

In rejecting Applicants' claim 10, the Office Action cited Snawerdt's Figs. 1-2, col. 5, lines 25-31, and col. 7, lines 34-40 (Office Action, page 3) as allegedly teaching a method of "modulating the output of an optical source to optically encode electronic data using phase modulation to generate an optical signal," and that the control circuit 18 has a two bit delay applied by the circuit in Fig. 2. In rejecting Applicants' claim 11,

Snawerdt's Fig. 1 and col. 7, lines 34-60 were cited as allegedly teaching "demodulating the APol-DPSK signal using an even bit delay line interferometer (Office Action, page 5).

The Office Action also acknowledged that Snawerdt fails to teach the features relating to DPSK and alternating the polarization of the phase shift keyed optical signal, and thus, took official notice that it is well known to modify a phase modulator to perform DPSK, and further cited Ito's Fig. 13, col. 10, lines 19-35 as allegedly teaching "alternating polarization of the phase modulated optical signal using a modulator such that successive optical bits have substantially orthogonal polarizations to generate an alternate polarization phase modulated signal" (Office Action, page 5).

However, Applicants submit that the combination of the teaching of Snawerdt with Ito is improper because such a combination would be contrary to the original intent of Snawerdt or Ito.

Specifically, Applicants submit that Snawerdt never intended his phase modulated signals to be combined with polarization alternation, as suggested by the Examiner. This is clearly evident in Snawerdt's Fig. 1, in which a depolarizer 14 is used in the transmitter 10, between the laser 12 and phase modulator 16. The presence of the depolarizer 14 in the transmitter is inherently incompatible with polarization alternation because it produces a depolarized output, whereas polarization alternator requires a polarized signal input. Thus, Snawerdt actually teaches away from Applicants' invention, and even if combined, Snawerdt and Ito will result in a transmitter that is not capable of producing polarization alternation in the manner provided in Applicants' invention.

Furthermore, the combination of Snawerdt and Ito is also contrary to the intent in Ito. Ito teaches an optical transmitter for intensity modulation of NRZ data, while "the phase modulator 3 modulates the phase of the intensity-modulated signal based on a bit rate frequency sine wave 105 corresponding to the bit rate frequency of the signal" (Fig. 13; col. 10, lines 21-24). Throughout Ito's discussions of various embodiments, Ito consistently teaches that data encoding is done by intensity modulation, and that phase modulation is performed based on a bit-rate frequency sine wave.

In other words, Ito never intended phase modulated data encoding to be used in conjunction with its teaching of alternating polarization. Thus, the combination of Snawerdt's transmitter with Ito's alternating polarization, as suggested in the Office

Action, would have resulted in a transmitter for phase modulation, which is contrary to the intended purpose of Ito.

Furthermore, even if combined, Snawerdt and Ito would have resulted in an inoperative device. Specifically, Snawerdt teaches a telecommunications system with a transmitter that includes a depolarizer 14 and a phase modulator 16, and a receiver having an interferometer 40 with a depolarizer 48 in one arm of the interferometer (e.g., Snawerdt, Fig. 3 and col. 6, lines 10-19).

Snawerdt's receiver, with the depolarizer 48 in one arm of the interferometer 40, would have been inoperative for the purpose of demodulating the transmitted DPSK data with alternating polarizations. Specifically, the polarization of the incoming APol-DPSK signal needs to be maintained in the interferometer so that the two bits separated by an even bit delay will interfere at the output of the interferometer. Snawerdt's depolarizer, on the other hand, works against this because it substantially reduces the component of the polarization of the delayed bits that is parallel to the polarization of the non-delayed bits. Thus, even if combined, Snawerdt and Ito, would have resulted in a device that is inoperative for the demodulating the transmitted DPSK data with alternating polarizations, and would not have resulted in Applicants' claimed invention.

As such, independent claims 10 and 29 are allowable over Snawerdt in view of Ito under 35 U.S.C. 103.

Claims 2-3 have been amended to depend from claim 10. As such, for the same reasons set forth above, these claims are also allowable over Snawerdt in view of Ito.

Therefore, Applicants respectfully request that the rejection of claims 2-3, 10 and 29 be withdrawn.

Claim 4

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt in view of Ito and further in view of Fujiwara. The rejection is traversed.

Claim 4 has been amended to depend from amended claim 10.

Since the rejection under 35 U.S.C. 103 given Snawerdt in view of Ito has been overcome, as described hereinabove, and there is no argument put forth by the Office

Action that Fujiwara supplies that which is missing from Snawerdt in view of Ito to render the independent claim obvious, this ground of rejection cannot be maintained.

As such, claim 4 is allowable over Snawerdt in view of Ito and further in view of Fujiwara under 35 U.S.C. 103. Therefore the rejection should be withdrawn.

Claims 5-9, 12-14, 18-23, 25-26 and 28

Claims 5-9, 12-14, 18-23, 25-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snawerdt in view of Ito and further in view of Yao. The rejection is traversed.

Claim 18 has been canceled, and its rejection is therefore moot.

Claim 5 has been amended to depend from amended independent claim 10. Since there is no argument put forth in the Office Action that Yao teaches the features missing in Snawerdt and Ito, as set forth above in connection with claim 10, claim 5 is also patentable over Snawerdt in view of Ito and further in view of Yao.

Furthermore, since claims 6-8 depend from claim 5, these claims are also patentable over the combination of Snawerdt, Ito and Yao.

Independent claims 9, 12, 25-26 and 28 each recites at least a feature directed to providing simultaneous polarization alternation and optical data encoding by phase shift keying. Claims 9, 12 and 25-26 have been amended to further clarify that the signal inputs to the two arms of the Mach-Zehnder modulator have the same polarization. This is supported by the original specification, e.g., Figs. 4A-B. As such, no new matter has been added.

The Examiner acknowledged, e.g., on pages 12-14 and 16-17 of the Office Action, that Snawerdt fails to teach a Mach-Zehnder modulator or a modulator means having a polarization rotation device to provide simultaneous polarization alternation and data encoding by phase shift keying, as provided in independent claims 9, 12, 25-26 and 28. The Examiner relied on Ito for allegedly teaching the polarization modulator 4 (Fig. 13) to modulate the data such that adjacent bits have mutually orthogonal polarizations.

The Examiner further stated (Office Action, pages 13-14) that since many components of a Mach-Zehnder modulator can be produced by integrated fabrication techniques, and Yao discloses having phase modulator and polarization rotation within

the arms of the interferometer, it would be obvious to accomplish simultaneous polarization alternation and phase shift modulation.

In other words, the Examiner is relying on Yao for allegedly teaching the Mach-Zehnder modulator (or modulator means) for simultaneous polarization alternation and data encoding by phase shift keying. Applicants respectfully disagree.

Yao's teaching is directed towards polarization independent data modulation. All that Yao teaches is that polarization rotators 52, 52' are used to rotate the polarized beam 16 and modulated beam 26', respectively, before and after modulation (col. 6, lines 24-26; Fig 4). There is simply no teaching in Yao regarding the use of a Mach-Zehnder modulator for polarization alternation, and certainly, nothing about achieving polarization alternation simultaneously with phase shift modulation.

Thus, even if combined, Snawerdt, Ito and Yao, would not have resulted in Applicants' invention, as claimed in claims 9, 12, 25-26 and 28.

Claims 9, 12 and 25-26 have been amended to clarify Applicants' invention that the input signals to the two arms of the Mach-Zehnder modulator have the same polarization.

Yao, on the other hand, teaches that the Mach-Zehnder modulator has a polarization beam splitter 12 at its input (e.g., Figs. 1-5), which provides two orthogonally polarized beams that are required for proper functioning of the device in Yao (e.g., col. 4, lines 25-59; col. 5, line 63 - col. 6, line 51).

This configuration of a Mach-Zehnder modulator, as taught by Yao, when combined with Snawerdt and Ito, would not have resulted in a functioning device for the purpose of Applicants' invention, because in Applicants' claimed invention, the input signals to both arms of the Mach-Zehnder modulator have the same polarizations.

Thus, even if combined, Snawerdt, Ito and Yao still does not teach each and every element of Applicants' invention, as provided in claims 9, 12, 25-26 and 28. As such, these independent claims are not obvious over the combined teaching of Snawerdt, Ito and Yao.

Claims 19-21 have been amended to depend from independent claim 25, and claims 22-23 have been amended to provide consistent terminologies in the preambles. Since claims 19-23 depend, either directly or indirectly from claim 25, for the same

reasons set forth above, these claims are also not obvious over the combined teaching of Snawerdt, Ito and Yao.

Therefore, Applicants respectfully request that the rejection of Claims 5-8, 12-14, 18-23, 25-26 and 28 be withdrawn.


Conclusion

It is respectfully submitted that the Office Action's rejections have been overcome and that this application is now in condition for allowance. Reconsideration and allowance are, therefore, respectfully solicited.

If, however, the Examiner still believes that there are unresolved issues, the Examiner is invited to call Eamon Wall at (732) 530-9404 so that arrangements may be made to discuss and resolve any such issues.

Respectfully submitted,

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